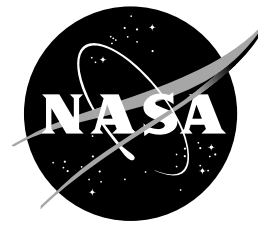


# NASA Facts

National Aeronautics and  
Space Administration

**Goddard Space Flight Center**  
Greenbelt, Maryland 20771  
(301) 286-8955



FS-2004-6-067-GSFC

## Aura A Mission Dedicated to the Health of the Earth's Atmosphere

### Why Study Earth's Ozone, Air Quality and Climate?

Because we need to understand and protect the air we breathe. The Earth's upper atmospheric ozone layer protects all life. Between 1980 and 2000, protective ozone in the stratosphere decreased 3% globally. Depletion of the ozone layer allows more ultraviolet radiation to reach the surface, which is harmful to living things. The Montreal Protocol, an international agreement, banned the use of ozone destroying chemicals and the rate of ozone depletion seems to have slowed.

The Earth's air quality is fundamental to public health and ecosystems. The atmosphere has no political boundaries; air pollution moves great distances across oceans and continents. The air breathed by one person today was air breathed by somebody else yesterday. The quality of air has degraded over certain parts of the world and has become a health issue.

The Earth's climate is affected by changes in atmospheric composition. It is undeniable that human activity is beginning to alter the climate. The global rise in surface temperatures since the 1950s is correlated with the increase in greenhouse gases, especially carbon dioxide.

### The Aura Mission

NASA's Earth Observing System (EOS) Aura satellite will study the Earth's ozone, air quality and climate. The mission is designed specifically to conduct research on the composition, chemistry and dynamics of the Earth's upper and lower atmosphere employing multiple instruments on a single satellite. Aura will explore the atmosphere's natural variability and its response to human activity so that we can better predict changes in the Earth system.



*Aura spacecraft*

Measurements from Aura's four primary instruments will provide accurate data for predictive models and useful information for local and national agency decision support systems. Aura is the third in a series of large Earth observing platforms to be flown by NASA with international contributions.

### Key Science Questions

The measurements from Aura's four instruments will help to answer questions about changes in our life-sustaining atmosphere such as:

1. Is the stratospheric ozone layer recovering?
2. What are the processes controlling air quality?
3. How is the Earth's climate changing?

## **Aura and the A-Train**

Aura will be a member of the “A-Train,” a constellation of six Earth-observing satellites flying in a formation by 2007. These satellites include: Aqua, CloudSat, CALIPSO, and the Orbiting Carbon Observatory (OCO). The French space agency, Centre National d’Etudes Spatiales (CNES), plans to send a sixth satellite, PARASOL, to join the A-Train. While each satellite has an independent science mission, these complementary satellite observations will enable scientists to obtain more information than they could by using the observations of a single mission.

## **Aura - Part of NASA’s Earth Observing System**

The purpose of NASA’s Earth Science Enterprise is to improve understanding of the total Earth system and the effects of natural and human-induced changes on the global environment. The NASA Office of Earth Science studies Earth system science, born of the recognition that the Earth’s land surface, oceans, atmosphere, ice cover, and life are dynamic and highly interactive.

The Earth Science Enterprise is comprised of an integrated fleet of spacecraft and in situ measurement capabilities; data and information management systems. The goal of these systems is to acquire, process, archive, and distribute global data sets; and research to convert data into new knowledge of the Earth system. It is NASA’s contribution to the U.S. Climate Change Science Program, an interagency effort to understand the processes and patterns of global change.

## **Aura Instrument Descriptions**

### **High Resolution Dynamics Limb Sounder (HIRDLS)**

HIRDLS is an infrared limb-scanning filter radiometer measuring trace gases, temperature, and aerosols in the upper troposphere, stratosphere, and mesosphere. The instrument will provide critical information on atmospheric chemistry and climate. Using new limb scanning technology HIRDLS will provide accurate measurements with daily global coverage at high vertical and horizontal resolution. HIRDLS was developed via a partnership between NASA and the United Kingdom’s National Environmental Research Council (NERC). Organizations supporting NERC in this effort were Oxford University and Rutherford Appleton Laboratory, whereas the National Center for Atmospheric Research (NCAR), the University of Colorado, and Lockheed Martin were the major US participants.

### **Microwave Limb Sounder (MLS)**

MLS is a limb scanning emission microwave radiometer. MLS will measure important ozone-destroying chemical species in the upper troposphere and stratosphere. In addition, MLS has a unique ability to measure trace gases in the presence of ice clouds and volcanic aerosols. Aura’s MLS is a major technological advance over the MLS flown on Upper Atmospheric Research Satellite (UARS). NASA’s Jet Propulsion Laboratory (JPL) developed, built, tested, and will operate MLS.

### **Ozone Monitoring Instrument (OMI)**

OMI is an Earth viewing spectrometer that measures solar reflected and backscattered light in a selected range of the ultraviolet and visible spectrum. The instrument provides complete daily coverage of the sunlit portion of the atmosphere. OMI is Aura’s primary instrument for tracking global ozone change. OMI measurements will continue the 25-year record of column ozone observations made by NASA’s TOMS series.

OMI has a broad wavelength range and better spectral resolution than TOMS. OMI will also measure column amounts of trace gases important to ozone chemistry and air quality. OMI will map aerosols and estimate ultraviolet radiation reaching the Earth’s surface.

The Netherlands Agency for Aerospace Programs (NIVR) and the Finnish Meteorological Institute (FMI) contributed the OMI instrument to the Aura mission. The Netherlands companies, Dutch Space and TNO-TPD, together with Finnish companies, Patria, VTT and SSF, built the instrument.

### **Tropospheric Emission Spectrometer (TES)**

TES observes the thermal emission of the Earth’s surface and atmosphere. TES was designed to make both nadir measurements (like OMI) and limb measurements (like MLS). TES will measure tropospheric ozone and other gases important to tropospheric pollution and tropospheric ozone production. TES has a smaller footprint than OMI, but it does not have the swath coverage of OMI. Because of the smaller footprint, TES can make measurements through cloud “holes” when they are present. NASA’s JPL developed, built, tested, and will operate TES. The TES primary objective is to measure trace gases associated with air quality.

Aura Mission web site:  
<http://aura.gsfc.nasa.gov/>

Earth Science Enterprise web site:  
[www.earth.nasa.gov](http://www.earth.nasa.gov)